

WHAT IS CLAIMED IS:

1. A method for manufacturing a nonvolatile semiconductor memory wherein memory cells each having a tunnel oxide film, a floating gate, a first insulating film and a control gate stacked in this order are formed in a matrix on a semiconductor substrate, the method comprising the steps of:

forming the tunnel oxide film on the semiconductor substrate;

forming a first conductive layer to be used as a material of the floating gate on the tunnel oxide film;

patterning the first conductive layer in stripes extending in one direction;

forming a source/drain region in a surface of the semiconductor substrate by using the first conductive layer as a mask;

forming the first insulating film on the first conductive layer;

forming a second conductive layer on the first insulating film;

forming the control gate in stripes composed of the second conductive layer, the first insulating film in stripes and the floating gate in a rectangular solid composed of the first conductive layer by etching with a mask in stripes extending a direction perpendicular to the

first conductive layer;

removing a portion of the tunnel oxide film immediately below a sidewall of the floating gate by isotropical etching; and

5 depositing a second insulating film on the control gate, sidewalls of the first insulating film, the floating gate and the tunnel oxide film to be covered with the second insulating film.

2. The method for manufacturing a nonvolatile
10 semiconductor memory according to Claim 1, wherein

after the second insulating film is deposited, thermal oxidation is performed to oxidize the sidewall of the floating gate via the second insulating film.

3. The method for manufacturing a nonvolatile
15 semiconductor memory according to Claim 1, wherein

isotropic etching of the tunnel oxide film after formation of the floating gate is performed by wet etching using a fluorinated acid.

4. The method for manufacturing a nonvolatile
20 semiconductor memory according to Claim 1, wherein

the second insulating film is a silicon oxide film formed by chemical vapor deposition.